Voluson Performance Series
Quick Guide

Voluson
Extraordinary Vision

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5	Rotary and paddle switch controls	13	PW mode and gain control/ X and Y axis†	23	Measure key
6	Acoustic power output/Doppler volume	14	2D mode and gain control	24	3D/4D* key
7	New patient/end exam	15	HD/pan zoom	25	Print/save keys
8	Probe/program key	16	Depth Control	26	Trackball and trackball keys
		17	Focal zone position control	27	Freeze/run
		18	Navigation rotary control	28	TGC controls

† 3D Control

This document is not intended to replace the Basic User Manual.
Please refer to the Basic User Manual for further instructions.

Getting Started

Entering patient information

Key numbers can be found on pages 2 and 3

1. Press the New Patient key (7).
2. Enter patient information. If a number is not entered, the system will assign an ID number. Patient ID is required to store images. If LMP, GA or EDD is not given, no growth information will be displayed (for growth trending on subsequent exams, the same ID number must be used).
3. Select Start from the top trackball key (26) or from the menu.
4. To end the exam, select New Patient Key (7) then select End Exam from display menu.

Selecting probe and presets

1. Press Probe/program key (8). All connected probes will be displayed in the menu.
2. Using the corresponding rotary key, menu navigation knob or the menu arrow, select desired probe.
3. The corresponding rotary knob can be rotated to select the desired application and setting. The menu arrow may also be used to make the selection.

Saving/printing images
Icons for Print/Save keys

1. To save or print image, press the appropriate P Key (25).
2. Print keys are set up in Utilities and can be set for multiple functions (Utilities > System Setup > Connectivity > Button Configuration).
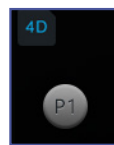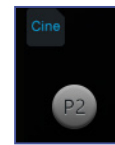
Icons for Print and Save keys

Img
P1
Save to hard drive

3D
P1
Save 3D volume to hard drive

4D
P1
Save 4D volume to hard drive

Cine
P2
Save cine to hard drive

Img
P1
Send image to PACs

P1
Send image to printer

P3
Record/ Pause DVR

Annotation

1. To activate, press ABC key (21). Activation can also be done by pressing space bar if system is so configured in Utilities (Utilities > System Setup > User Settings tab > check box next to 'Use Space key to switch "ABC"on').
2. Select word from menu using navigation knob (18) or the menu arrow (20).
3. Free typing is possible at any time after annotation is activated.
4. To set word, press the right or left trackball key (26) (Set).
5. To delete last word, select bottom trackball key or push corresponding rotary knob.
6. To delete all annotations, press the Clear hardkey on the console (22).

Dual/Quad screen format

1. Press the desired view (dual or quad) above the Print/Save keys (25).
2. To move to next image, select update from right trackball key (26) or select appropriate dual/ quad button (may select freeze if desired before updating).
3. To return to single screen, press single screen button or press 2D knob on console (14).

Zoom

1. Two zooms available: Pan Zoom and HD Zoom.
2. To Pan Zoom, turn zoom rotary knob (15).
3. For High Definition Zoom, press the zoom knob. Adjust the Region of Interest (ROI) to include the area of interest. Size can be adjusted by selecting top trackball key (Change).
4. Activate using the right side trackball key.
5. To return to unzoomed state, press zoom key again or press the 2D knob.

Acoustic Power Output and Audio Volume

1. Adjust Acoustic Power output by using Acoustic Power/volume rotary key (6).
2. MI (mechanical index) and TI (thermal index) are displayed in heading bar of image.
3. Switch between power and volume by pressing the rotary key.

Measurements

Generic Distance

1. Press the Measure key (23) twice for generic measurements.
2. Using the Navigation knob (18) or menu arrow (20), select desired measurement from the display menu.
3. Move caliper to desired location using trackball. To set caliper, select Set on the right or left trackball key (26). Using trackball, place next caliper at desired location.
4. To move endpoint, select the top trackball key (Change).
5. To complete measurement, set with right or left trackball key.
6. To activate another caliper, move the trackball.

Ellipse

1. Select Ellipse from the display menu using navigation knob or menu arrow.
2. Using trackball, move caliper to the desired location and set with left or right trackball key.
3. A second caliper will appear with the ellipse active. Place this caliper at desired location and set.
4. Using the trackball, adjust the ellipse to desired size; to move endpoints select top trackball key (Change).
5. Select Set to complete measurement.
6. To activate another ellipse, move the trackball.

Calculation

1. Press the Measure key (23). The calculation package for the active application (e.g. Obstetrics) will open.
2. Using the Navigation knob (18) or menu arrow (20), select the desired measurement.
3. Set the calipers using the right or left trackball keys.
4. Enter using the trackball key (Set).
5. For measurements requiring ellipse, please see above under Generic Measurements.
6. To navigate to alternative calculation packages or study group (e.g. from fetal biometry to fetal echocardiography), select Measure Application at top of left display menu.

Report/worksheet

1. Press Report key (10).
2. Measurements that have been completed are displayed. To move through the report, use Page toggle switch (5).
3. Comments may be added to the end of the report on the Comment page (select Exam Comments on the display menu or page down until comment page is reached).
4. Include/remove any portion of the printed report by adding/removing checkmark on display menu (e.g. remove graphs from report).
5. Print Preview, located in the display menu, will allow preview of report before printing.
6. Report can be saved to archive, exported as a PDF, or may be printed with a line printer from either the preview page or main report menu.

Trending Fetal Growth

1. Patient must have had previous exam performed on the system or must have past exam information entered.

   To enter past information:
   • New patient key > Past Exam.
   • Enter date and desired measurements in appropriate column.
   • Save and Exit.
   • Select Continue Exam from the left menu.
2. LMP, GA or EDC must be entered on demographic screen.
3. From the worksheet menu, select Graph.
4. Using arrow, select 'Trend' beneath the graph.
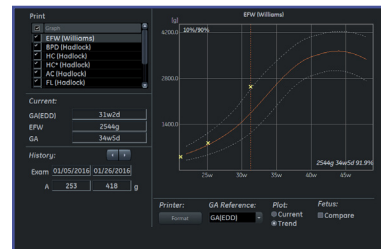
Doppler and M-Mode

Color* Doppler

1. To activate, press the CF knob (12).
2. To adjust gain, turn CF knob.
3. To adjust ROI position, move trackball.
4. To adjust ROI size, select top trackball key (26) to change trackball function. Adjust box size with trackball.
5. To move between position and size, use top trackball key.
6. PRF (pulse repetition frequency) and WMF (wall motion filter) can be adjusted with appropriate toggle keys as indicated on the monitor (5).
7. To activate power Doppler or HD-Flow™, select from the color Doppler display menu.

Pulsed-Wave Doppler

1. To activate, press PW knob (13).
2. Place sample volume in vessel with trackball.
3. Sample volume size can be adjusted by selecting top trackball key (26).
4. Select left trackball key to activate spectrum.
5. Gain is adjusted by turning the PW knob.
6. PRF and WMF can be adjusted as with color Doppler above.
7. Adjust speed from display menu.
8. Select left trackball key to pause spectrum if re-position of sample gate is necessary.

M Mode

1. To activate, press the M knob (11).
2. Place line in area of interest.
3. Select 2D/M run from right or left trackball keys.
4. Gain is adjusted by turning M knob.
5. Adjust speed from the display menu. 6 speeds are available.

AMM* (Anatomical M Mode)

1. Activate M Mode.
2. Select AMM from the display menu. Display can be either vertical or horizontal.
3. Place line in area of interest. Line can be rotated using the rotary key (5) or with the trackball.
4. To add a second line, activate from menu. Move between the first and second lines with the bottom trackball keys (26).

Imaging

Auto Optimize – Helps optimize contrast and gray scale resolution based on a specific region of interest or anatomy within the image.

CrossXBeam^{CRI™} (CRI) – Spatial Compounding. Pulses are transmitted not only perpendicularly (typical) to the acoustic window, but also combined with oblique directions. This results in enhanced contrast resolution, tissue differentiation and border detection. Multiple levels available within the Sub-menu.

SRI (Speckle Reduction Imaging) – An adaptive algorithm to help reduce the unwanted effects of speckle in the image. This can result in enhanced contrast resolution and reduced speckle noise artifact. Multiple levels available within the Sub-menu.

Dynamic Control – Allows user to modify range of grays available in the image to help optimize contrast. The higher the number, the more contrast in the image.

Gray Maps – Helps optimize the grayscale of the anatomy being visualized by varying the appearance of the shades of gray. A color tint may also be added to the gray map. Multiple map choices available in the submenu.

2D Image Optimization

1. Select appropriate preset from display menu using the Navigation knob, menu arrow or appropriate keyboard key.
2. Gain is adjusted using the 2D rotary control (14). Overall gain should be adjusted before adjusting TGC (28).
3. Apply Auto Optimize.
4. Depth control is a toggle switch above the dual/quad screen keys (16).

5. Adjust focal zone using toggle next to Depth toggle (17). Place focal zone at or just below area of interest.
6. Adjust frequency as needed from toggle switch (5). Each probe has 6 frequencies – 3 harmonic frequencies and 3 fundamental frequencies. Frequency currently being used is displayed on the lower left menu display as well as in the image information area in the upper right screen (higher frequency provides enhanced resolution but results in less penetration).

7. To adjust gray map, go to submenu and select Gray Map. A color tint may also be added from this same submenu.

Sub Menu

IF	THEN
Image too grainy	1. Activate Harmonics 2. Activate/adjust SRI levels 3. Activate/adjust CRI level 4. Change gray map (submenu) 5. Decrease Dynamic Control
Image too soft	1. Activate Auto Optimize 2. Adjust SRI level 3. Deactivate/adjust CRI 4. Change gray map (submenu) 5. Increase Dynamic Control
Image too noisy	1. Activate Auto Optimize 2. Decrease overall gain 3. Increase frequency 4. Increase SRI level 5. Activate CRI 6. Decrease acoustic power output

IF	THEN
Image too contrasty	1. Turn off Auto Optimize 2. Adjust SRI level 3. Turn off CRI 4. Change gray map (submenu) 5. Decrease Dynamic Control
Uniformity issue	1. Activate Auto Optimize 2. Adjust focal zone position 3. Adjust TGC 4. Adjust frequency
Cystic Imaging	1. Activat Auto Optimize 2. Decrease gain 3. Increase CRI level 4. Increase frequency 5. Increase Dynamic Control
Technically Difficult Patient	1. Select Penetration Preset 2. Activate Auto Optimize 3. Decrease frequency 4. Deactivate harmonics 5. Select lower frequency probe

Archive and Image Management

To review images in the current study

For single image:
Using menu arrow, select desired image from clipboard. Press left trackball key (26) (Reload).

For entire study:
1. Select Archive (9) on console.
2. Select Review from the display menu.
3. Move through images using arrow and trackball.
4. Select Reload beneath image to reload a single image.

To review stored closed exam

1. Open Archive (5) on console.
2. Using menu arrow or arrow keys from the keyboard, select patient using right or left trackball key (Set).

3. Select desired exam for review.
   a. Select Exam Review on display menu or left double click right trackball key for exam review.
   b. Double click right trackball key.

Exporting Images

Media supported: CD-R, CD-RW, DVD+RW, USB device (USB must not contain any 3rd party software or require separate power source).

Export entire single exam

1. Insert media.
2. Press Archive on console.
3. Select desired patient and exam using right or left trackball key (Set).
4. Select Export from display menu.
5. Choose format type.†
6. Name file if you want a name other than the default provided.
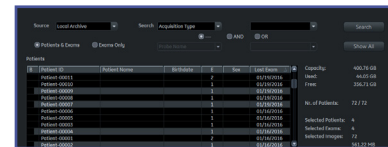7. Choose Anonymization if desired.
8. Select Save.

To export multiple exams

1. Insert media.
2. Press Archive on console.
3. Highlight desired patients.
   a. For sequential patients, press and hold Shift key on keyboard.
      i. Highlight 1st study on list using right or left trackball key (Set).
      ii. Highlight last study on list using right or left trackball key (Set).
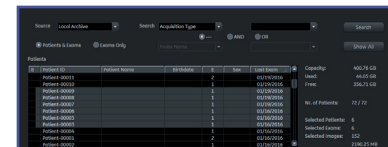
   b. For patients in a random order, press and hold Control key on keyboard.
      i. Highlight various studies in a random order using right or left trackball key (Set).

4. Select Export from display menu.
5. Choose format type.*
6. Name file.
7. Choose anonymization if desired.
8. Save.

To save selected images
Current exam:
1. Insert Media.
2. Press Archive on console.
3. Using menu arrow, select desired image(s) using right or left trackball key (Set).
4. Select Export from display menu.
5. Choose format type.†
6. Name file.
7. Choose anonymization if desired.
8. Select Save.
9. A print key can also be customized to save images.

Closed/stored exam
1. Insert Media.
2. Press Archive on console.
3. Select desired patient and exam from list.
4. Select Exam Review from display menu or double click left trackball key for exam review.
5. Using menu arrow, select desired image(s) using right or left trackball key (Set).
6. Select Export from menu.
7. Choose format type.†
8. Name file.
9. Choose anonymization if desired.
10. Select Save.

Deleting studies from the hard drive

1. Press Archive key on console.
2. Highlight patient to be deleted using right or left trackball key (Set).
3. Select Delete from display menu.
4. Answer question appropriately:
   Yes = delete all data from the system (images and patient data).
   No = delete images only from the archive.
   Cancel = nothing is deleted.

To Delete multiple studies at once
Grouped Studies
1. Press and hold Shift key on keyboard.
2. Highlight 1st study on the list using right or left trackball key (Set).
3. Highlight last study on list to be deleted using right or left trackball key (Set).
4. Select Delete from display menu.

Multiple Studies in random order
1. Press and hold Control key on keyboard.
2. Highlight various studies using right or left trackball key (Set).
3. Select Delete from display menu.

Importing study back to the system
1. Insert media.
2. Press Archive on console.
3. Select Import.
4. Select the appropriate media from pull down choices.
5. Select appropriate file or folder.
6. Select Import.

DICOM® Files transfer images to a DICOM network.

Voluson™ Format can reload exam back on system or in 4D View.

3D/4D Imaging*

Note: *a fluid interface is needed to perform surface rendering in 3D or 4D*

Volume Acquisition

3D

1. Select volume probe.
2. Press 3D/4D on console (24).
3. Select 3D from display menu. Select desired setting.
4. Using trackball, adjust ROI (region of interest) box position and size with trackball and top trackball key to include area of interest. For surface rendering, if material (e.g. placenta, myometrium) is in front of the surface, activate (push) SonoRender*live* on rotary key (#). This places the green render line within the fluid for optimal rendering. Turn to adjust sensitivity as needed so green line is close to anatomy without touching.
5. Position transducer in the center of the structure to be imaged.

6. Start acquisition using right trackball (26) or freeze key (27). The acquisition is automatic; do not move the transducer during the acquisition.
7. Save volume with appropriate Print Key (25).

4D

1. Select volume probe.
2. Press 3D/4D on the console (24).
3. Select 4D from display menu. Select desired setting.
4. Using trackball, adjust ROI position and size with the trackball and top trackball key to include area of interest.
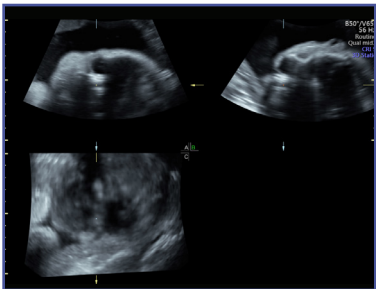5. Position transducer in the center of the structure to be imaged.
6. Start acquisition using right trackball key.
7. Save volume with appropriate Print Key (25).

Volume displays

Following acquisition of dataset, multiple displays are possible

Sectional Plane – display divides the screen into three sections, A Plane (initial acquisition plane), B Plane (90 degrees clockwise to A Plane) and C Plane (orthogonal to A and B Planes). A Rendered Image is not displayed in Sectional Plane display. (Fig. 1)
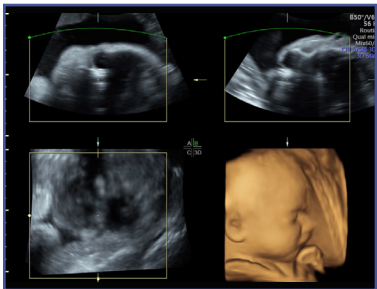

Figure 1 – Sectional planes display

Figure 2 – Placement of green rendered line for rendering

Single, Quad or Dual screen displays are available. Any plane is available in a singe screen by selecting Single Screen from the console; the active/reference image will be displayed. Quad format displays all three orthogonal planes simultaneously. Dual display is available in the menu to display A and B only, A and C only or to return to A, B and C.

Rendering – composite picture (3D image) of the acquired volume. Only structures within the rendered box will be displayed. Green render line and render box controls anatomy displayed. A fluid interface is needed for surface rendering (Fig. 2).

Figure 3 – Render Mode options

Gray 1		Gray 2	
A	Surf. Sm.	Surf. Sm.	K
B	Surf. Text.	Light	Q
D	Max	Max	M
E	Min	Min	N
F	X-Ray	X-Ray	X
J	HDlive™ Tex.	Grad. L.	W

Single, Quad or Dual screen displays are available. The Rendered image can be viewed as a single image by selecting single screen from the console.

Quad format displays all three orthogonal planes and the rendered image simultaneously. Dual display will display the A Plane (plane of acquisition) with the rendered image The rendered image is made up Render Modes (Gray 1 and Gray 2) (Fig. 3). Eight possible modes are available.

Surface render modes render the surface closest to the green render line. Transparency render modes (Max, Min, X-Ray) render the entire ROI box to create the rendering.

Surface – renders the surface closest to the green render line (Fig. 4a, 4b and 4c).

Surf. Sm. – smooth surface.

Figure 4a – Surf. Sm.   **Figure 4b –** Surf. Text.   **Figure 4c –** Grad. L.

Surf. Text. – textured surface.

Grad. L.– appears as if a light is shining on the structure.

Transparent modes render below the surface (Fig. 5a, 5b and 5c).

Max – helps enhance maximum intensity echoes (e.g. bone).

Min - helps enhance minimum intensity echoes (e.g. fluid).

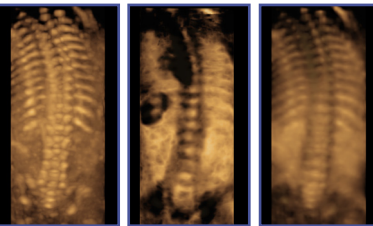**X-Ray –** average of all echoes within the render box.

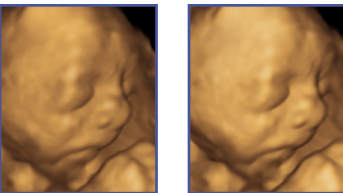**Figure 5a –** Max   **Figure 5b –** Min   **Figure 5c –** X-ray

Mix – Two rendered modes can be combined or 'Mixed' to create the desired rendered look (Fig. 6a and 6b).

Threshold – When used with surface rendering, threshold allows lowlevel echoes to be suppressed in the images (Fig. 7a, 7b and 7c).

Fig. 7a – Normal Threshold   **Fig. 7b –** Threshold too low   **Fig. 7c –** Threshold too high

Volume Manipulation

The volume dataset is not limited to the initial 3 planes displayed, Each plane can be rotated on the X, Y or Z axis as well as shifting through an individual plane in a parallel fashion (parallel shift). By manipulating the volume, any plane necessary within the volume can be displayed (Fig. 8a, 8b and 8c).

Figure 6a – Surf. Text./Surf. Sm. mix 50/50   **Figure 6b –** Surf. Text./Grad. L. mix 50/50

X Axis (11) – rotates the active image on the horizontal axis.

Y Axis (12) – rotates the active image on the vertical axis.

Z Axis (13) – rotates the active image in a clockwise or counter-clockwise motion.

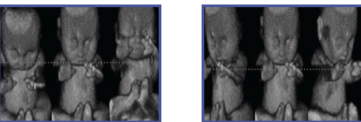**Parallel Shift (14) –** moves in/out of the dataset without rotating on an axis.
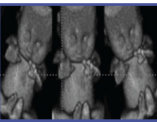

Fig. 8a – X Axis rotation   **Fig. 8b –** Y Axis rotation

Fig. 8c – Z Axis rotation

* Software option, may not be available in all countries.

Imagination at work

www.gehealthcare.com. Product may not be available in all countries and regions. Contact a GE Healthcare Representative for more information

Data subject to change.

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†A list of format types can be found on page 10.

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